**Ohm’s Law, And What Constitutes as a Circuit**

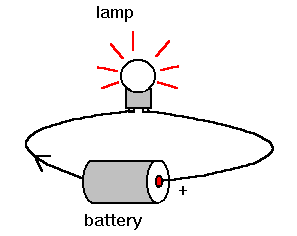
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Main idea #1: **In order for a circuit to be established and light a bulb, there must be a path for the charges to flow from one end of the battery to the other.**

The path for the charges (the electrons) to flow must be a conductor, so a wire is most commonly used. In fact, the moving electrons come from the wire itself. The wire must attach to the conductive side of the light bulb, with the bottom of the light bulb connected to the battery with either a wire or directly. Then the wire must attach to the opposite end of the battery of which the light bulb is touching.

**Example #1**: Would this light bulb light?

**NO.**



Why or why not?

*It would not because the second wire does not connect the side of the light bulb to the battery; thus, the electrons are not given a path to flow.*

Main idea #2: **Current, which determines the brightness of a light bulb, is a value directly proportional to Voltage, and inversely proportional to resistance.**

Current is the speed at which electrons are flowing, and is measured by amps, or **I**.

The equation we use to find current is

**I = V/R**

Where **V** represents voltage, which is measured in Joules per second or more commonly, Watts, and **R** represents resistance, which is measured in Ohms.

We refer to this relationship as **Ohm’s Law.**

Current and resistance are values that are not always constant for a circuit, whereas voltage is.

For example, resistance is affected by a multitude of outside factors, including temperature, width of a wire, and length of a wire. These minute changes in turn affect the current of a circuit due to the relationship outlined in Ohm’s Law. Voltage, however, depends on the voltage sold with the battery.

**Example #2:** Let’s say you have a 9V battery. You use an Ammeter to measure the current in the circuit and find it to be 4.5 amps. What is the resistance in this system?

**G:** V = 9 **F:** R = (?) **E:** I=V/R

I = 4.5 4.5 = 9/R

R = **2 Ohms**

*Since we are given the variables for current and voltage and asked to solve for resistance, we can use Ohm’s law which relates the three. When the numbers are plugged in accordingly, we can see that there are 2 ohms of resistance.*

**Bonus:** If the temperature were to drop, how would this affect the current?

The Current would rise.

*When temperature goes up, so does resistance. Thus, when temperature decreases, resistance acts accordingly, going down as well. Since Resistance is related inversely to current, a lower resistance would result in a higher current.*

Further Resources: <http://www.engineeringinteract.org/resources/siliconspies/flash/concepts/simplecircuits.htm> (interactive lesson)

<http://www.allaboutcircuits.com/vol_1/chpt_5/2.html> (more complex explanation of circuits)

<http://www.ehow.co.uk/video_4936274_electric-circuit-experiments-assembling-simple.html> (video outlining how to make a simple circuit)